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Optimisation of Brownies Formulation Made of Taro Composite Flour

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Introduction

Brownie is a kind of popular cake often consumed for social activities including snacking and celebrations, and is usually made of wheat flour. An Asian recipe for preparation of brownies comprises flour, sugar, powder of cocoa, baking powder, eggs and glycerol mono-stearate (GMS). After dough preparation, cookies are often oven-cooked at 150-170 °C for 30 min (Bennion & Bamford 1979; Sunaryo 1985). The present study aims at investigating the textural properties of different formulations of brownies without wheat and using some composite flour made of taro, banana, and mung bean, and tries to recommend a corresponding optimal formulation.

Material and Methods

A response surface method with a composite design was used. Various amounts of GMS in the 0.14-0.26% range, baking powder in the 0.2-0.52% range, and skim milk in the 6.4-7.6% range were used in addition to the composite flour made of 50% taro, 30% of banana and 20% of mung bean without wheat ingredient. Final products were then analyzed using an uniaxial texturometer that recorded force-time curve equivalent to an instrumental texture profile analysis (TPA) illustrated in Fig. 1, with hardness H1 & H2, resilience (A5/A4), cohesiveness (A2/A1), springiness (L2/L1), and chewiness (H1.(A2/A1).(L2/L1), as per Armero et al. 1997.

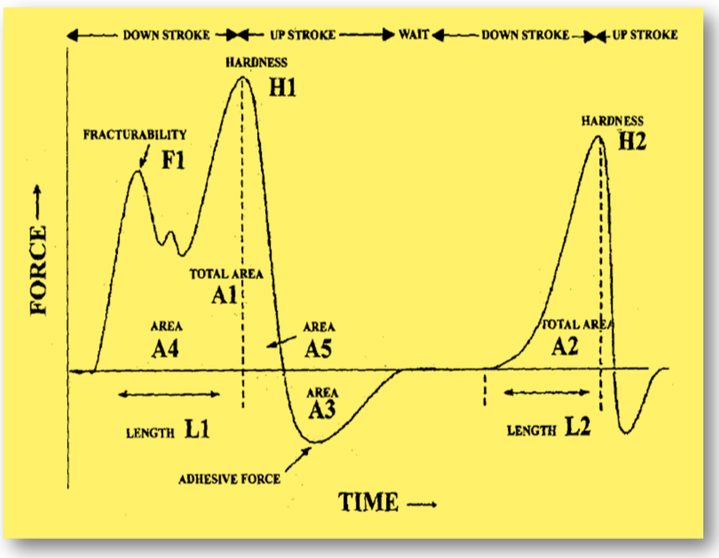

Fig. 1.TPA.Interpretation of texture parameters from a complete record (Armero et al. 1997).

Results

The minimum hardness data on both puncture cycles was recorded, which in turn helped to describe the brownie tenderness (Fig 2 & 3). Tenderness was optimal for an intermediate amount of baking powder, and a relatively high amount of skim milk. Complementary resilience, springiness, and cohesiveness were also recorded in the 0.38-0.53 range, 2.1–2.6 range, and 0.66-0.83 range, respectively.

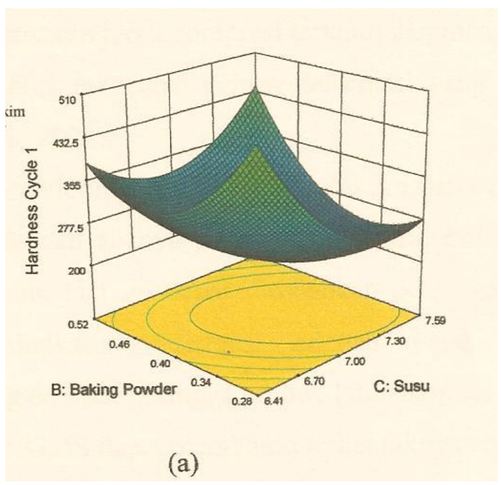

Fig 2. RSP for hardness cycle 1

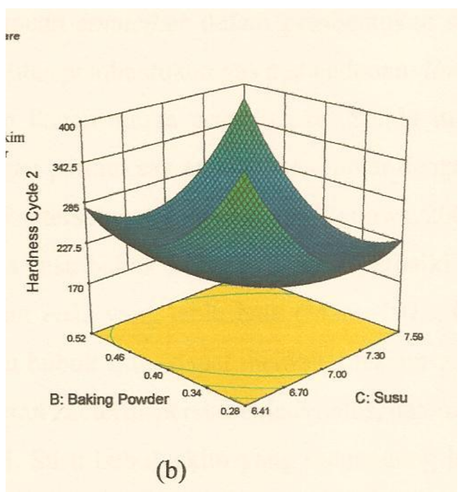

Fig 3. RSP for hardness cycle 2

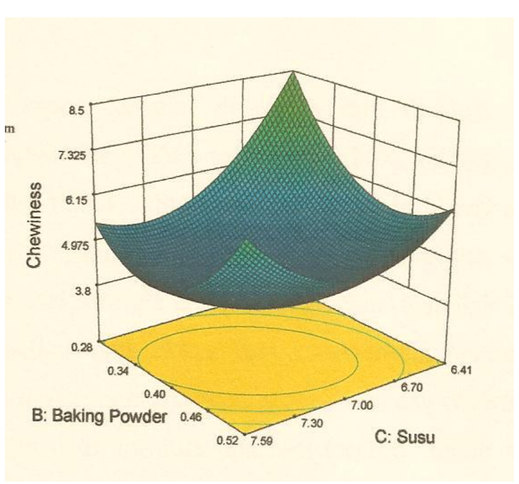

Fig 4. RSP for chewiness

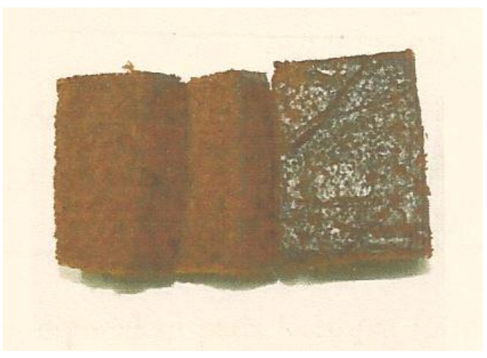

Fig 5. Picture of optimal formulation

If no optimum was observed for resilience, springiness and cohesiveness parameters fitted with a polynomial model, the chewiness parameter (Fig. 4) was revealed being strongly influenced by the addition of baking powder and glycerol mono-stearate and skim milk, and is likely to significantly contribute to the organoleptic perception of the product (Fig. 5).

Conclusion

The present investigation confirmed the interest of some earlier trials, where using composite flour made of taro, banana and mung bean without wheat, could be used for the formulation of brownies. The polynomial model of prediction gave an optimum of formulation using 0.24% of glycerol mono-stearate, 0.36% of baking powder, and 7.32% of skim milk. Some later investigations will be needed to test the corresponding consumer acceptability for the formulated brownies using some ranking tests.

References: Bennion, E. & G.S.T. Bramford. The technology of Cake Making. 5th Ed. Leonard Hill Book London (1979); Sunaryo, E. Pengolahan Produk Biji-bijian. Fakultas Teknologi Pertanian. IPB, Bogor (1985); Armero, E. & Collar C. Texture properties of formulated wheat doughs. Z Lebensm Unters Forsch A 204: 136-145 (1997).